

### REMARKS

Claims 1-3, 6, 7, 9, 12-17, and 42-54 are pending in the application. Claims 9, 42, 44, and 46 have been cancelled by this amendment. New claim 55 has been added to the application. Therefore, claims 1-3, 6, 7, 12-17, 43, 45, and 47-55 are at issue.

The specification has been amended to correct an obvious typographical error. The amendment adds no new matter. DC-1 is a nonporous film, defined at page 16, lines 4 and 5, prior to corona treatment. DC1-AD1 is the same film after corona treatment (see specification, page 17, lines 1-9; Example 4, page 24; and Figs. 3-6.)

Claims 9, 42, 44, and 46 have been deleted to facilitate prosecution. These claims have not been cancelled for reasons related to patentability, and applicants reserve the right to pursue the subject matter of these claims in continuing applications. Claims 43, 45, and 47-51 have been amended to depend from independent claim 1 rather than independent and now-cancelled claim 42.

Independent claim 52 has been amended to recite that the nylon film can absorb more liquid after surface activation than prior to surface activation. This feature is also recited in independent claim 1. Claims 52 and 53 also have been amended to correct the units for watt density. Support can be found at page 17, Tables 2 and 9 of the specification, for example.

Claim 52 also has been amended to clarify that the film surface is activated by energy such that the surface receives a watt density of at least  $75 \text{ W-min/m}^2$ . Support for this amendment can be found in the specification at page 7, line 31 through page 8, line 1; page 17, Table 2 and lines 5-9; page 18, Table 3; and original claim 2.

New claim 55 depends from claim 1 and recites that the surface activated surface has a dyne level of at least 70 dynes. Support can be found in the specification at page 18, line 27 through page 19, line 2.

The present claims recite a nylon film consisting only of monomers that provide amide linkages, i.e., a polyamide. Such films are known in the art as hydrophobic

films (see cited WO 97/36798, page 9, lines 19-29) and are incapable of absorbing useful amounts of aqueous liquids. Applicant has found, unexpectedly, that by subjecting the film to a high amount of total energy, this high amount of total applied energy provides more than a mere surface activation, but actually *permanently* changes the morphology of the nylon film, as illustrated in the figures of the specification. This change allows a previously hydrophobic nylon film to absorb increased amounts of an aqueous liquid, *without* the presence of a hydrophilic comonomer in the film, as required in WO 97/36798.

The permanent change in nylon film morphology is clearly shown in Figs. 3-6 and Example 4 of the specification. This portion of the specification shows that an aqueous solution was not merely coated on the surface of the film, but had been absorbed well into the film. Importantly, about one half of the film structure had been modified in permanent way, such that even after the aqueous liquid was extracted from the film, the modified structure *still remained*, i.e., is permanent.

The fact that the nylon film structure had been permanently changed was a surprising result that could not be predicted from any known prior art, including the cited references. As disclosed in cited WO 97/36798, corona treatment is used to modify the surface character of a film to promote meat adhesion. All other prior art of which applicant is aware also teaches that corona treatment is merely a surface modification, and it is well known that this surface modification can be removed by wiping with a brush or a cloth. This is a common practice after printing on a film to prevent the film layers from adhering to one another. There is no known art teaching that a corona or similar energy treatment permanently alters or modifies the structure of a polymer to a depth of about 5 microns.

The application of a high total level of energy to a nylon film to arrive at the present invention is disclosed in the specification at page 17, lines 16-22, stating:

"In the experiments it was observed that the surface activation was so high, that the dyne level was outside of the usual dyne measurement techniques. For this reason in future tests the level of surface activation was estimated in terms of watt density.

Watt density is calculated according to the following formula:

$$\text{Watt density} = \frac{\text{power supply (watts)}}{\text{width of tube (M)} \times \text{line speed min/M}} "$$

It is important to note that W-min/m<sup>2</sup> is *not* a measure of surface activation, but is a measure of the total energy that is absorbed by the film.

Applicants, in this passage from the specification, and as recited in claims 51-53, show that the units "W-min/m<sup>2</sup>" is an appropriate measure of *the total energy that has been applied to the nylon film*. The dyne test was used, and claimed as an indirect, minimum measure of the amount of energy being absorbed. Also see specification, page 18, line 26 through page 19, line 2, wherein it is stated that at a dyne level of 70 or higher, the dyne test cannot be used with any reliability. For this reason, the applied energy levels in the examples are presented as watt density because the dyne level was too high, i.e., greater than 70, to accurately measure. It should be noted herein that a dyne level of 70, as recited in new claim 55, *can* be measured. Therefore, persons skilled in the art are able to determine a dyne level of "at least 70" as recited in claim 55.

In order to achieve the high levels of energy required to achieve the benefits of the presently claimed invention, applicant utilized a specially prepared, highly powered corona treatment device, i.e., having a power greatly exceeding that of commercially available devices. In fact, the designers of the corona treatment device were concerned that, at such high power levels, the film would be destroyed, as opposed to improved. However, the very high applied energy levels actually resulted in an increased amount of liquid absorbing into the film. This was proven by the photomicrographs in Figs. 3-6 and in the Tables of the specification, and was highly unexpected.

In summary, applicants have taken a nylon film, free of any other monomers and having an inherently high surface energy level, then significantly increased the surface energy of the film prior to incorporating a liquid into the film. The result is a permanent change to the morphology of the active surface of the film, and an ability to absorb greater amounts of aqueous liquids. This is contrary to all practice in the art, especially for food contact surfaces, because prior high surface energy nylon films adhered too tightly to food products.

Claim 9 stands rejected under 35 U.S.C. §112, second paragraph, as being indefinite for reciting the presence of a crosslinked polyvinylpyrrolidone, while claim 1 recites that the nylon film consists of two or three of (a), (b), and (c). Applicants have cancelled claim to facilitate prosecution, and thereby render the rejection under 35 U.S.C. §112, second paragraph, moot.

Claims 42-44 and 46-50 stand rejected under 35 U.S.C. §102(b) as being anticipated by WO 97/36798 (WO '798). Claim 45 and 51-54 stand rejected under 35 U.S.C. §103 as being obvious over WO '798. For the reasons set forth below, it is submitted that these rejections are in error and should be withdrawn.

First, the rejection relating to claims 42, 44, and 46 is moot in view of the cancellation of these claims. Second, the rejection relating to claims 43, 45, and 47-50 has been overcome in view of this amendment wherein these claims now depend from claim 1. Claim 1 is free of the rejection based on WO '798, and therefore claims 43, 45, and 47-50 also are free of this rejection. The examiner's attention also is drawn to the amendment to claim 52 which now recites, like claim 1, that the nylon film can absorb a higher amount of a liquid after the surface activation. Accordingly, claims 52-54, like claim 1, are free of the rejection based on WO '795.

In responding to comments made by the examiner to support the rejection, applicant provides the following:

A presently claimed nylon film differs substantially from a block copolymer film of WO '798, thereby precluding rejections under 35 U.S.C. §102(b) and under 35 U.S.C. §103. The very term "block copolymer" means that the polymer contains at least two monomers and that the monomers are arranged in a specific manner, i.e., distinct polymer segments of monomer A and distinct polymer segments of monomer B. A schematic example of a block copolymer include: -A-A-A-B-B-B-A-A-A-B-B-B-. To further illustrate a block copolymer, applicants provide a definition of the term, and examples, in Exhibit A, submitted concurrently with this amendment. WO '798 explicitly teaches a *block* copolymer having a water-insoluble segments prepared from a first monomer (see WO '798, at page 9,

lines 19-29) and hygroscopic segments prepared from a *different* second monomer (see WO '798, at page 10, lines 10-26).

Importantly, the present claims recite a nylon having *only* amide units, i.e., to a polyamide *only*, and exclude other monomers and blocks of monomers from the nylon. The claimed polymer is *not* a block polymer and is free of hygroscopic monomers and segments.

The examiner is reminded that "[A]nticipation requires a showing that each limitation of a claim is found in a single reference, either expressly or inherently." *Atofina v. Great Lakes Chemical Corp.*, 441 F.3d 991, 999 (Fed. Cir. 2006). With respect to a rejection under 35 U.S.C. §102(b), MPEP §2131 states, in part:

"TO ANTICIPATE A CLAIM, THE REFERENCE MUST TEACH EVERY ELEMENT OF THE CLAIM

'A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.' *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987)... 'The identical invention must be shown in as complete detail as is contained in the ...claim' *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). The elements must be arranged as required by the claim, but this is not an *ipsissimis verbis* test, i.e., identity of terminology is not required. *In re Bond*, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990)."

Because WO '798 fails to teach or suggest a *nylon* polymer free of comonomers, the reference cannot anticipate the present claims.

Applicants also specifically direct the examiner's attention to Example 4 at page 24 of the specification and the accompanying SEM micrographs in Figures 3-6, and particularly Figure 4. Example 4 and the SEM micrographs explicitly demonstrate that a solution composition of Example 1 (i.e., C7) was not merely coated on the inner layer, but had been *absorbed* into the inner layer. Most importantly, the innermost 50% of the inner layer structure of the nylon had been modified *permanently*. This permanent modification converted the hydrophobic nylon film (and identified as such in WO '798) into a film having an improved capability of absorbing aqueous liquids, which is both new and unexpected in the art.

In particular, after the solution composition was extracted from the inner layer, the modified nylon structure still remained. As stated in the specification at page 24, lines 10-16:

"Initial results showed that the principal difference between untreated and absorbed film was that a 10 micron thick porous inner layer with irregular surface morphology was changed into a 5 micron thick porous layer and a 5 micron thick nonporous innermost layer with irregular surface morphology. This indicated that the composition had absorbed into the inner film layer and impregnated the inner layer to a depth of about ½ the original thickness."

Claims 49, 50, and 54 recite this feature. This is another reason the present claims are not anticipated by, nor obvious over, the WO '798 reference.

With respect to the corona treatment disclosed in WO '798, a person skilled in the art would not have been motivated to surface treat a claimed nylon film to the extent presently claimed after reading WO '798. Corona treatment is discussed in WO '798 at page 13, lines 1-21 stating (emphasis added):

"To assist in reducing or eliminating cook-out, a food-contact layer having a surface energy of greater than 34 dynes/cm, preferably greater than 46 dynes/cm, and most preferably greater than 50 dynes/cm is preferred. At such surface energies, the food-contact layer is *believed to provide sufficient adhesion with the food product to prevent or substantially minimize cook-out.*

If the film *adheres so strongly* to the cooked food product such that it cannot be peeled therefrom without tearing away portions of the same, the copolymer of the food-contact layer can be blended with one or more polymers that lower its adhesion. In this regard, less polar polymers such as polyolefins having a surface energy of about 36 dynes/cm or less can provide beneficial results. On the other hand, *if adhesion* between the film article and food product *is too low*, the surface energy of the food-contact layer can be increased. This can be accomplished by, for example, subjecting the surface of the food-contact layer to sufficient energetic radiation (i.e., of sufficiently high intensity or for a sufficiently long period of time) to achieve a desired increase in surface

energy. Examples of radiative techniques include plasma and corona treatments. Alternatively, the surface energy of the food-contact layer can be increased by including one or more polar additives such as polyesters, polyamides, polylactic acid, and polar polyolefins such as ethylene/unsaturated acid copolymers, modified polyolefins, and blends thereof."

The first paragraph of this excerpt refers to a surface modification that does not contemplate a nylon film as presently claimed, i.e., subjected to high total energy levels such that the hydrophobic nylon film is permanently changed and can *absorb* a greater quantity of a liquid. The second paragraph teaches blending in a polyolefin to reduce surface energy, or increasing surface energy of the *block copolymer* disclosed in WO '798 by plasma or corona treatment. Importantly, WO '798 states that "[A]lternatively, the surface energy...can be increased by including...polyamides..." Accordingly, WO '798 does *not* teach surface treating a polyamide, but rather to incorporate a polyamide into the block copolymer to increase surface energy, if necessary.

This disclosure in WO '798 supports the present disclosure at page 8, lines 26-30 of the specification stating:

"Polyamide casing materials which have a surface energy in the order of up to about 45 dynes generally have sufficient meat adherent properties and corona treatment is not required. It is believed that if a polyamide was corona treated, the resulting film would adhere excessively to a meat surface, causing the above-mentioned problems."

Although WO '798 may disclose that the block copolymer disclosed in the reference can have a surface energy of greater than 50 dynes, the above *explicit* disclosure clearly teaches that the surface energy of a *polyamide* should *not exceed* 45 dynes. It is submitted, therefore, that WO '798 fails to teach or suggest a high total energy surface treatment of a hydrophobic polyamide, or to provide a nylon film consisting of amide groups *only*, as claimed, which is permanently altered in structure and has an improved capability to absorb liquids.

The examiner states that WO '798 discloses a film having a liquid absorbed therein, wherein the surface of the film can have a surface energy of at least 50 dynes. The examiner further states *incorrectly* that the block copolymer of WO '798 "consists of" nylon

12. The examiner further states that the feature of corona treatment and liquid application are to be given little patentable weight because the limitations are directed towards a process limitation. As discussed below, applicants traverse this contention because the claimed features are *not* directed to a process limitation, but to features of the claimed nylon film.

As previously stated, WO '798 discloses a film formed from a *block copolymer* having a substantially water-insoluble segment and a substantially hygroscopic segment (see WO '798 abstract, page 3, lines 27-30, and page 4, lines 11-13 and 17-18, for example). The segments are prepared from different monomers. The hygroscopic segment is formed from a coreactant capable of homopolymerizing to provide a material that is substantially hygroscopic. See WO '798, page 8, lines 3-15 and page 10, lines 10-26 (e.g., ethylene glycol). The hygroscopic segments retain an aqueous modifier, or additive, that is transferred to a food product (WO '798, page 8, lines 16-19). The water-insoluble segment is formed from a coreactant capable of homopolymerizing to a material that is substantially water insoluble. See WO '798, page 8, lines 3-15 and page 9, lines 19-29 (e.g., amide). The water-insoluble segment does *not* "dissolve or solvate" in the aqueous modifier, rather its purpose is to provide structural integrity to the film such that the film remains intact upon separation from a food product (WO '798 page 8, line 27 through page 9, line 2). Note particularly that WO '798 specifically states that the water-insoluble segments do not *solvate*. In other words, WO '798 discloses a polymer having structural segments (water insoluble) and absorbing segments (hygroscopic). The water insoluble segments preferably are a *derived* from an amide, for example (WO '798, page 9, lines 24-29). The hygroscopic segments are different from a nylon, as set forth in WO '798 at page 10, lines 10-26.

WO '798 specifically discusses the purpose of the hygroscopic blocks, i.e. (1) in the following paragraph, and the hydrophobic blocks, i.e., (2) in the following paragraph at page 9, lines 3-7 of WO '798:

"Thus, a copolymer including both water-insoluble and hygroscopic segments advantageously (1) allows for sorption and subsequent transfer (to a food product during cook-in) of a modifier, and (2) remains intact (or at least substantially



intact) so that the food-contact layer can be separated from the food product at any desired time after cooking."

The copolymer of WO '798 therefore cannot "consist of" nylon 12.

The present claims recite a *nylon film consisting of* an amide, which is substantially different from the block copolymer of WO '798. The block copolymer of WO '798 *requires* a hydrophobic block (e.g., nylon) and a hydrophilic block (e.g., WO '798, page 10, lines 10-26). The present claims recite a nylon consisting of the amide forming monomers recited in the claims. The claimed nylon therefore, *by definition*, contains only repeating amide units and is no way similar to a block copolymer as disclosed *and* required by WO '798.

On this basis alone WO '798 cannot anticipate the present claims. However, the present claims also recite that the amount of liquid absorbed by a nylon film having a surface dyne level of at least about 50 dynes (at least 70 dynes in claim 55) and/or an applied watt density of at least about 75 W-min/m<sup>2</sup> absorbs more liquid than a nylon film surface that has not been surface activated. Contrary to the examiner's contentions, this *functional* language in the claims has patentable weight and is not directed to a process limitation. This feature of the claims further distinguishes the present claims from WO '798 and is supported by Table 2, page 17 of the specification showing a 15% and 67.5% increase in absorbed liquid after application of high amount of energy to the nylon film. Also see Tables 3-5 of the specification for additional supporting data.

It is well known the functional language is permissible in claims. See M.P.E.P. §2173.05(g). In particular, functional language is permissible, as long as definite boundaries are set, and often is used when a physical or chemical change or property cannot be adequately described, or is not known, but the effects of the physical or chemical change or property is known and can be claimed. In such a case, there is no other way for an applicant to claim his invention.

In the case at bar, the claims recite a surface-activated nylon film, wherein a surface of the nylon film has been activated to a dyne level of at least about 75 dynes (70

dynes in claim 55) and/or receives energy of a watt density of at least about 75 W-min/m<sup>2</sup>. Furthermore, the surface activated nylon film has an ability to absorb more liquid than the nylon prior to surface activation. As previously discussed, and as set forth in claims 49, 50, and 54, the activation not only affects the surface of the film, but actively changes the morphology of the film, as shown in Example 4 and Figs. 3-6. This is the feature of the claimed film that permits a hydrophobic polymer to absorb relatively high amounts of an aqueous liquid. These features recited in the claims *are not* process limitations. The features define the nylon film and the properties of the nylon film, in a manner that fully complies with 35 U.S.C. §112.

WO '798 not only fails to teach or suggest a nylon film as presently claimed, but also fails to teach or suggest *any* significant modification of physical properties of the *water-insoluble* segment of the block copolymer to enable this segment to absorb a liquid because such modification *would decrease* the structural integrity of the water-insoluble segment and potentially lead to failure of the film. In fact, WO '798 discourages modification of the physical properties of the water-insoluble segment, which is present in WO '798 to provide structural integrity.

WO '798 refers to using corona treatment to increase the surface energy of the food contact layer (page 13, lines 1-6). This increase in surface energy is provided solely to increase adhesion between the film and the food product, thereby reducing undesirable purge or cookout. WO '798 also teaches that the surface energy can be increased by adding a polar additive, such as a polyamide. WO '798 further teaches that when the food contact layer is PEBA (poly(ether block amide)), then corona treatment is not required. Still further, it is noted that WO '798 also *cautions against* the surface activity of a film being too high because this will lead to tearing of the product upon film removal (page 13, lines 7-8). It should be noted that the present claims recite a surface energy of *at least* 50 dynes (70 dynes in claim 55), which WO '798 not only discourages, but teaches away from. WO '798 fails to teach or suggest the application of sufficient energy to provide a watt density of at least 75 W-min/m<sup>2</sup>.

As stated in the present specification at page 17, lines 24 through page 18, line 5:

"It may also be appreciated by a person of skill in the art that the above dyne levels are well in excess of that achieved by corona treatment as used to facilitate meat adhesion. It is generally accepted that level of between 40 to 50 dynes provide acceptable meat adhesion. It is also generally accepted in the field that if films are treated to a dyne level above about 50 dyne that the film unduly adheres to the meat surface. In the present instance it was surprisingly observed that despite these high levels of surface activation and contrary to expectations the meat film released cleanly from the meat surface without meat scarring."

WO '798 absolutely fails to teach or suggest, and fails to consider or address, that surface activation to the degree claimed can increase the ability of a *hydrophobic nylon* to absorb a liquid. In fact, the disclosure of WO '798 leads to a contrary conclusion. WO '798 teaches that (1) the presence of a water-soluble segment is *essential* for the film to absorb a liquid and (2) the water-insoluble segment does not absorb liquid but provides structural support. WO '798 merely suggests the possible use of a corona treatment in accordance with *conventional* corona treatments used in the industry to increase surface adhesion of polyolefin films. Such conventional use is acknowledged in the present specification. Applicant submits that a person of skill in the art would therefore understand the reference to corona treatment in WO '798 to refer to the instance when the water-insoluble segment is an olefin. Still further, it is noted that films exemplified in WO '798 are *not* corona treated, or otherwise surface activated.

Applicant, therefore, submits that a nylon consisting only of amide linkages, which has undergone *sufficient* surface treatment, e.g., to *at least* about 50 dynes (at least 70 dynes in claim 55) or *at least* about 75 W-min/m<sup>2</sup>, and has an increased ability to absorb a liquid, must be physically and/or chemically different from a nylon that is not surface activated, and different from the segmented, block copolymer film disclosed in WO '798. It is not incumbent upon the applicant to define, or even theorize, as to what the difference is, but can rely upon claiming the improved properties demonstrated by the surface activated nylon film.

To summarize the differences between the present claims and WO '798, the independent claims recite that the film is a nylon containing only amide linkages, such a polyamide clearly excludes the block copolymers disclosed in WO '798, and that surface activation using a sufficiently high amount of energy (which those in the art considered

detrimental) actually increases the amount of liquid that can be absorbed by the permanently altered film. These features are neither taught nor suggested by WO '798, which precludes a novelty rejection under 35 U.S.C. §102(b). Because dependent claims 43, 45, and 47-50 each incorporate the features of the independent claims, these claim 1 also are novel over WO '798. It also is submitted that these are nonobvious differences over WO '798, and that claims 43, 45, and 47-54 are patentable over WO '798 under 35 U.S.C. §103.

With respect to claim 49, the examiner's rationale is incorrect. WO '798 does *not* disclose absorption through the entire thickness of the nylon. WO '798 teaches absorption by the hygroscopic segments of the polymer only. The water insoluble segments do not absorb water. There is no disclosure at WO '798 stating that absorption is through the entire thickness at page 8, lines 16-20. The portion of WO '798 relied upon by the examiner merely states that the hygroscopic segments of the copolymer sorb and retain at least some of the aqueous modifier. The disclosure in WO '798 relating to a *water-insoluble segment, e.g., a polyamide*, is at page 8, line 27 through page 9, line 2, i.e., do *not* dissolve or solvate in the aqueous modifier.

With respect to claim 50, the disclosure in WO '798 referred to by the examiner relating to thickness (page 11, line 23-26) merely discloses the total thickness of the film. It does *not* remotely relate to how deeply an aqueous liquid absorbs into the film. In addition, even if an aqueous liquid absorbs throughout film, the absorbing portion of the WO '798 polymer is different from the claimed nylon and is known to absorb large amounts of liquid. Nylon is not known to sufficiently absorb liquids, and particularly not to a depth of 5 microns.

In summary, it is submitted that claims 47-50 and 51-54 are both novel and nonobvious over WO '798. WO '798 merely teaches a *block* copolymer wherein the hydrophobic blocks that provide structural integrity, and teaches optional surface activation of a film to avoid purge. WO '798 does not teach a polymer having only amide linkages, i.e., a polyamide as presently claimed. WO '798 fails to teach or suggest a *high* level of surface activation that improves the ability of a hydrophobic nylon to absorb a liquid, i.e., to increase the amount liquid that can be absorbed by the film. In fact, WO '798 provides no teaching or suggestion that the films disclosed therein have any ability to absorb an increased amount of

liquids. Because WO '798 does not disclose *every* presently claimed feature (i.e., does not disclose the presently claimed nylon), an obviousness rejection based on WO '798 cannot be maintained.

In the Office Action, the examiner set forth reasoning in an attempt to refute applicants' arguments directed to the patentability of the claims over WO '798. Applicants now address this reasoning:

(a) The examiner contends that WO '798 discloses nylon "having only amide units". The examiner is incorrect WO '798 fails to teach or suggest a nylon as claimed. As discussed above, WO '798 clearly teaches a *block* copolymer, in particular having hydrophilic segments and water-insoluble segments. See WO '798, page 9, lines 24-29, for a disclosure of the identity of the water-insoluble segment and page 10, lines 10-26, for a disclosure of the identity of the hygroscopic segments. It is *readily* apparent that the block copolymer of WO '798 contains PEBAX™ MX1074, identified in the reference as a poly(ether block amide). This polymer contains *ether* and *amide* units, further demonstrating the incorrectness of the examiner's statement. Also see page 9, and Exhibit A, above discussing the differences between the presently claimed nylon polymer and the block copolymer of WO '798.

(b) The examiner refers to a statement made by applicant with respect to WO '798 stating that a polyamide should have a surface energy of not more than 45 dynes, and asks where that is disclosed in WO '798. In his statement, the examiner refers to page 11 of applicant's previous amendment. At page 11, applicants *quote* WO '798 explicitly showing where in WO '798 this disclosure occurs, i.e., from page 11 of applicant's previous response is a direct quote from WO '798:

"This disclosure in WO '798 supports the present disclosure at page 8, lines 26-30 of the specification stating:

"Polyamide casing materials which have a surface energy in the order of up to about 45 dynes generally have sufficient meat adherent properties and corona treatment is not required. It is believed that if a polyamide was corona treated, the resulting film would adhere excessively to a meat surface, causing the above-mentioned problems.""

As previously stated, although WO '798 may disclose that the *block* copolymer disclosed in the reference can have a surface energy of greater than 50 dynes, the above *explicit* disclosure of WO '798 clearly teaches that the surface energy of a *polyamide* (which is claimed and is different from the block copolymer of WO '798) should *not exceed* 45 dynes. It is submitted, therefore, that WO '798 fails to teach or suggest a high total energy surface treatment of a hydrophobic polyamide, or to provide a nylon film consisting of amide groups *only*, as claimed, which is permanently altered in structure and capable of absorbing liquids.

In summary, WO '798 teaches a surface energy of 50 dynes, but this is for a *copolymer*. WO '798 fails to teach or suggest increasing the dyne level of a polyamide as claimed, and explicitly states that the dyne level of a *polyamide* is 45 dynes or less. Rather, WO '798 teaches *adding* a polyamide to a film of low surface to increase the surface energy, see WO '798, page 13, lines 18-21.

(c) The examiner states that "because the film of Beckwith et al. sorbs liquid, all of the segments of Beckwith et al, including the insoluble segment, sorbs liquid." This is contrary to the teaching of WO '798. As stated in WO '798, at page 8, line 3 through page 9, line 2, with emphasis to assist the examiner:

"Turning now specifically to the *film of the present invention*, the food-contact layer includes a *copolymer having mer units derived from at least two co-reactants*. The *first co-reactant is capable of homopolymerizing to a material which is substantially hygroscopic*. In this manner, when the two co-reactants are copolymerized (by any suitable copolymerization technique known in the art), the resultant copolymer is believed to *contain two distinct types blocks or segments, some of which provide water insolubility and other which provide hygroscopicity to the polymer*. The two types of segments function both interdependently, in that they are inseparable parts of the same polymer, and independently, in that they provide the polymer of the food-contact layer with water insolubility and hygroscopicity. This is highly advantageous for the several reasons.

The *hygroscopic, i.e., water sorbing or swellable, segments of the copolymer sorb and retain at least some of a modifier, particularly aqueous modifiers, i.e., those which are suspended or dissolved in an aqueous carrier, when the modifier is brought into intimate contact therewith*. (Of course, where the modifier is not aqueous in nature, the water-insoluble segments can provide the desired sorption and retention. Also, where the modifier is, for example, an emulsion, both types of segments can be involved in sorption and

retention.) Subsequently, when the food-contact layer is brought into contact with a food product, at least a portion of the modifier transfers from the copolymer to the food product. Although such transfer most readily occurs during the cook-in process, cook-in is not required to effect transfer.

*The water-insoluble segments to the copolymer prevent the food-contact layer from being solubilized by the food product during and after cook-in and do not themselves dissolve or solvate in the aqueous modifier. In this regard, the water-insoluble segments serve to anchor the hygroscopic portions to the rest of the copolymer and thereby maintain the integrity of the food-contact layer during cook-in."*

WO '798 specifically teaches that the *hydrophilic* segment sorbs liquids and the hydrophobic segments provide structural integrity. See WO '798, page 8, line 3 through page 9, line 7.

The examiner's statement is contrary to the explicit teachings of WO '798. A mixture containing cotton balls and steel balls can absorb a liquid, but the steel balls of that mixture do not. Furthermore, to the extent the hydrophobic segments of block copolymer of WO '798 absorb a liquid, the reference fails to teach or suggest *improving* upon the amount of liquid absorbed, as presently claimed.

(d) The examiner states that it is unclear how integrity of a polymer is decreased by the absorption of water. This is not merely applicants argument, it is expressly stated in WO '798. See paragraph (c) above wherein WO '798 states that the "water-insoluble segments of the copolymer present the food contact layer from being solubilized" and that the water-insoluble segments "serve to anchor the hygroscopic portions to the rest of the copolymer and thereby maintain the integrity of the food-contact layer during cook-in."

(e) The examiner's states that modification of physical properties is given little patentable weight. Applicants have previously addressed the erroneous contention in that various claim features are structural or process limitations having no patentable weight. The basis of the invention is modification of a nylon film to achieve increased liquid absorption. This is achieved by permanently modifying the surface of the film, to a depth of about one-half of film thickness. This permanent modification can be achieved, for example, by methods set forth in claim 2. In summary, the claims are directed to a nylon film having an improved ability to absorb an aqueous liquid after a high energy treatment, compared to

the same nylon prior to the high energy treatment, wherein the high energy treatment permanently changes the morphology of the nylon film.

(f) The statement that "an ingredient that induces eating is therefore antiviral" has no basis in fact and absolutely falls on its face. Sugar induces eating and is not an antiviral agent. In addition, eating food earlier rather than later does not preclude infection; raw meat eaten early can cause infection, cooked meat eaten later may not. WO '798 fails to mention infecting a food product, which supports applicants' patentability position. Applicants are claiming that the liquid absorbed into the nylon can contain an agent that *actively protects against* microbial contamination. See present claim 17.

For all reasons set forth above, it is submitted that all pending claims are patentable over WO '798.

Claims 1-3, 6, 7, 9, 12-15, and 17 stand rejected under 35 U.S.C. §103 as being unpatentable over Erk et al. U.S. Patent No. 4,560,520 ('520) in view of Shimizu et al. U.S. Patent No. 6,352,762 ('762). It is submitted that this rejection is in error and should be withdrawn. It also is submitted that new claim 55 is patentable over the cited combination of references.

The '520 patent is directed to a film for packing foodstuffs. The film is a polyamide that can absorb at least 5% water. The examiner admits that the '520 patent fails to disclose a dyne level of at least 50 dynes. The examiner also admits that the '520 patent fails to disclose *any* other claimed features, but incorrectly dismisses them as having little patentable weight.

The '520 patent merely discloses a well known property of polyamides, i.e., an ability to absorb small amounts of water. The '520 patent states that to meet the objective of a wrinkle free, strong casing for sausage a polyamide that *can* absorb at least 5% water must be selected. This amount is defined as storing the polyamide in water at room temperature until the polyamide is saturated. The length of time to reach saturation is not specified, but is known in the art to require minutes or hours. The fact that the polyamide is able to absorb



water is a criteria used to select the film as defined by the '520 patent. The film however is dried and does not contain a liquid.

It must be noted that all polyamides absorb some moisture, up to a saturation level, when exposed to a high humidity. This saturation level is dependent on the type of polyamide and ranges from 3% for a PA 6 to 9 to 11% for PA 6, as described by the '520 patent. This amount however is insufficient for transferring additives in a liquid to a foodstuff. The polyamides used prior to the present invention simply did not absorb a large enough quantity of liquid to transfer additives from the liquid to an encased food product.

The '520 patent therefore teaches no more than a fact well known in the art. The reference is silent with respect to any surface treatments and with respect to polyamides having a capability of increasing the amount of liquid that can be absorbed.

The '762 patent discloses a polyamide film coated with a water-base coating mixture. The film is printable due to its *adhesiveness*. The examiner relies upon column 3, lines 23-31 to support his rejection, i.e., that the film is printable. However, the examiner has not considered *all* of the disclosure at column 3, lines 23-31, which recites:

"A coating of polyurethane obtained from polycarbonate polyol has a high wetting index, so treating the surface by corona discharge after forming the film is *unnecessary*." (lines 28-31, emphasis added)

Accordingly, the '762 patent teaches application of a coating to improve adhesiveness for coating, and teaches away from a surface treatment, like corona discharge.

The '762 patent is silent with respect to permanently changing a polyamide surface morphology such that the polyamide can absorb more liquid after surface treatment than prior to surface treatment. In addition, the '762 patent is directed to the external surface of a film for a food product, where printing occurs. The reference is not remotely related to actually incorporating a liquid into a polyamide film for contact with a food surface and transfer of an additive in the liquid to the food.

It is submitted that the combination of references fail to teach or suggest the claim invention as a whole. In particular, the examiner has failed to articulate with facts and

reasoning how a combination of the '520 and '762 patents render obvious claims that recite elements that are not even disclosed or suggested, or even addressed, in either reference alone, or in combination.

As stated above, the primary '520 patent discloses a tubular film used for packing foodstuffs in paste form. The tubular film is a polyamide that can absorb at least 5% water. Examples of polyamides having a minimum water absorption capability of 5% at room temperature in the water-saturated state are polycaprolactam (PA 6) and polyhexamethylenedipamide (PA 66) ('520 patent, column 4, lines 62-66).

The tubular films of the '520 patent are produced by extrusion of a primary tube of polyamide and subsequent simultaneous multiaxial stretching, and the primary tube of polyamide is completely fixed thermally after multiaxial stretching during controlled multiaxial contraction ('520 patent, column 5, lines 6-12). Example 1 of the '520 patent (column 6, line 44 through column 7, line 19) illustrate a polyamide of the reference. The '520 in Example 1 and the specification as a whole, *absolutely* fails to teach or suggest *any* surface treatment, let alone a surface treatment that increase the ability of a polyamide to absorb liquids. Such a surface treatment is a necessity in the presently claimed invention because it is the surface treatment that increases the liquid absorption capabilities of the nylon film.

The examiner is particularly directed to the Table at columns 9 and 10 of the '520 patent, and particularly Example 1 and Comparative Example 1. Note that the water absorption capacity *remained* at 11% for Comparative Example 1 vs. Example 1 using the *same* polyamide. It is the processing steps of the '520 patent that provide the improved results, not surface treatments that permanently change surface morphology to achieve absorption of a greater amount of liquid, as claimed.

Overall, the '520 patent discloses a process to produce a polyamide casing film that can be used to cook a sausage product. The product must be sufficiently strong and elastic to withstand the cooking pressure and not wrinkle after the sausage is cooled. The type of polyamide is selected based on its ability absorb water to a fully saturated state. The amount of water that can be absorbed is strictly a function of the type of polyamide. The '520

patent disclosure is *silent* with respect to any method of increasing the *amount* of liquid that can absorbed by a polyamide. Further, the '520 patent does not teach or suggest that the final film contains a liquid, only that a polyamide should be selected because it can absorb at least 5% of a liquid. The '520 patent fails to teach or suggest *increasing* the ability of a polyamide to absorb a liquid.

The '762 patent does not overcome the deficiencies of the '520 patent. As stated above the '762 patent is directed to a film possessing excellent adhesiveness with print ink, laminate, and other coating mixtures (column 1, lines 4-8). The '762 patent goes on to state:

"Polyamide film offers good transparency, physical strength, chemical stability, machine workability, and gas protection ability, and is mainly used for packaging. However, it is normally used with surface treatment. Such treatment includes compounded processes such as printing, metal vapor deposition, lamination with other types of film, or coating. *To improve adhesiveness*, the film surface is conventionally treated by means of corona discharge, low-temperature plasma processes, flaming, or chrome nitrating.

*Despite the use of such adhesiveness-improving processes, polyamide film suffers from insufficient adhesiveness for applications involving print ink, metal vapor deposition, lamination with other films, or use of other coating mixtures, especially under moistened conditions.*" ('762 patent, column 1, lines 12-26, emphasis added)

Note that the '762 patent is directed to improving *adhesiveness*, not to improving the ability of a nylon to absorb a liquid.

The '762 patent then teaches that this disadvantage is overcome by coating the polyamide film with a coating mixture containing constituents A, B, C, as defined in the '762 patent. The '762 patent goes on to state that adhesiveness can be improved by a *mild* corona discharge treatment of which is well known in the art and discussed in the present specification. The present specification *and* WO '798 also teach that, according to standards in the art, the corona treatment cannot be too intense because adhesiveness to the food product is too great. The present invention is directly in contrast to standards in the art.

It is clear that the '762 patent is directed to a polyamide film that provides adhesion to print ink, laminates, and coating mixtures in the presence of moisture. This level is well below the minimum dyne level recited in the present claims. The '762 patent illustrates that higher corona treatments will degrade the adhesion desired by the '762 patent. This is supported by Comparative Example 1 of the '762 patent, that was corona treated to 54 dyne/cm (Table 1). The adhesive strength of the film was *poor*. The laminate intensity of Comparative Example 1 also was the lowest of all the examples (Table 2). Accordingly, persons skilled in the art would not have been motivated, or have any apparent reason, to simply increase the surface energy of a polyamide to achieve improved film properties, but would be discouraged to do so.

A combination of the '520 and '762 patents fail to render the present claims obvious. The present claims require (a) a nylon film containing only amide linkages *and* (b) having a liquid absorbed therein, *and* (c) the nylon film has a surface activation prior to application of the liquid to a dyne level of at least 50 dynes (at least 70 dynes in claim 55) *and* (d) the film is capable of absorbing a higher amount of liquid after surface activation than before surface activation. The references do not remotely teach or suggest this combination of features or provide an incentive or apparent reason for a person skilled in the art to modify the references in a manner that arrives at the presently claimed invention. In particular, *neither* reference is directed to increasing the ability of a nylon film to absorb liquids.

The examiner's contention that the majority of the claimed features are given little patentable weight has been addressed above with respect to the rejection based on WO '798. Applicants have clearly shown that these features have patentable weight, conform with 35 U.S.C. §112, and properly and positively define the invention.

The references, alone and in combination, fail to teach or suggest an increase to the amount of liquid that the polyamide film can absorb, e.g., see Table of the '520 patent (discussed above) and the '762 patent is unconcerned with liquid absorption, but is directed to adhesion. Further, the '762 patent relies upon a coating to achieve improved adhesion.

With respect to surface activation, the '520 patent is totally silent and the '762 patent teaches that surface activation is detrimental, whereas a disclosed coating of the '762

patent provides improved results. Persons skilled in the art therefore have no incentive to surface activate a polyamide with any reasonable expectation of achieving unexpected results, especially if that result is improved liquid absorption that is neither taught nor suggested in *either* cited reference.

With respect to the examiner's comments relating to utilizing the dyne level of the '762 patent to achieve a desired printability, the ability to print on the film is not addressed in the present application and is not claimed. To the contrary, the present specification and cited WO '798 teach against excessive adhesiveness because the film will not separate cleanly from an encased foodstuff. See specification, page 8, lines 16-30, for example.

The examiner's comments with respect to claim 6 are inapposite. Prior nylon films could not absorb this claimed amount of a liquid. So the amount claimed would not even be considered by persons skilled in the art.

Further, because neither reference teaches nor suggests liquid absorption, the references cannot provide an incentive or an apparent reason to a person skilled in the art to provide a polyamide that exhibits improved liquid absorption. Applicant clearly has demonstrated, and claimed, polyamides having an increased ability to absorb liquids in the specification at Table 3, showing the improved polyamide weight gain due to liquid absorption in Tests 2 and 3. Also see Table 5, showing percent weight gains of claimed surface activated nylons.

For all the above reasons, it is submitted that claims 1-3, 6, 7, 9, 12-15, and 17 would not have been obvious over a combination of the '520 and '762 patents. With respect to the examiner's comments regarding claim 6, the '520 patent fails to teach *any* application of a liquid to the film, let alone 0.4 to 10 mg/cm<sup>2</sup>.

With respect to claim 7 and 12, 14, 15, and 17, these are preferred embodiments of the invention, and do not rely solely on the features recited in these claims for patentability, but rely upon the claimed features and *all* of the features recited in claim 1. For the reasons set forth above with respect to claim 1, it is submitted that claims 7, 12, 14,

15, and 17 also are nonobvious over the cited references. The examiner's contention regarding claim 17 and "inducing eating" has been addressed previously.

With further respect to claims 14, 15, and 17, and reference to an antiviral agent, applicant respectfully submits that the claim is being construed more broadly than is permissible. During examination, claims are interpreted as broadly as their terms reasonably allow. *In re American Academy of Science Tech Center*, 367 F.3d 1359, 1369, 70 USPQ2d 1827, 1834 (Fed. Cir. 2004). The words of the claim must be given their plain meaning unless applicant has provided a clear definition in the specification. It is submitted that to construe the term antiviral to extend to an agent which has no inherent antiviral properties, but simply induces eating, goes beyond the plain meaning of the term. Many agents that induce eating are *not* antiviral compounds, e.g., sugar or salt.

It also must be pointed out that an ingredient that "induces eating" does *not* preclude infection of a food product because food products, and especially those encased in films, are not consumed immediately after preparation, but can be stored, shipped, remain on store shelves, and in remain possession of the purchaser for a substantial time prior to the agent having an ability to "induce eating." Thus, the food product can be infected prior to or after an arguable inducement to eating occurs.

Claim 16 stands rejected as being obvious over the '520 and '762 patents in view of EP 0986 957 (EP '957). The patentability of claim 16 over the '520 and '762 patents has been discussed above. EP '957 fails to cure the deficiencies of the references. EP '957 merely discloses incorporation of a flavor component into a polysaccharide or protein binder for the transfer of the flavor to food. Neither the '520 patent, '762 patent, nor EP '957 teach or suggest incorporating a flavor, for example, into a hydrophobic nylon as claimed, or providing a nylon having *sufficient* surface activation to increase the amount of liquid that the film can absorb both prior references. Therefore, claim 16 is patentable over the combination of references for the same reasons set forth above with respect to claims 1-3, 6, 7, 9, 12-15, and 17.

In summary, it is submitted that the claims are in a proper form and scope for allowance or, should the rejection be maintained, for immediate appeal. An early and favorable action on the merits is respectfully requested.

Should the examiner wish to discuss the foregoing, or any matter of form in an effort to advance this application toward allowance, the examiner is urged to telephone the undersigned at the indicated number.

Dated: February 4, 2008

Respectfully submitted,

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